



# Alternative Credit Valuation

## 1. Introduction

This SBAI Toolbox memo on Valuation of alternative credit investments reaffirms the standards and guidance included in SBAI's Alternative Investment Standards, reviews other industry guidance specific to the valuation of illiquid credit, clarifies areas where there is no industry wide consensus around the valuation of these assets, (and suggests questions that investors may wish to ask when assessing a manager).

For any type of fund, valuation is the process of determining the values ascribed to each of the funds 'units of account' – in the case of an alternative credit fund, valuation is the process of determining the values for each credit instrument which makes up the Net Asset Value ("NAV") for the fund.

Institutional investors usually<sup>1</sup> require NAVs to be stated on a fair value ("Fair Value") basis, to satisfy their own accounting requirements. Fair Value is defined under International Financial Reporting Standard (IFRS) 13 and under US General Accepted Accounting Principles (US GAAP) Accounting Standards Codification (ASC) 820 as:

*"[T]he price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date."*

Determining Fair Value can be straight forward for funds that trade in liquid markets, where for example closing prices of securities are readily observable. It gets more difficult, however, when trading activity is not transparent, or when assets (or liabilities) are less liquid or not traded at all.

Alternative credit managers frequently transact in assets that require a degree of subjective judgement in the valuation process.<sup>2</sup> In the most liquid of cases, such credit investments are valued based on active trading prices observed by and provided by dealers or market makers. In certain instances, such values are aggregated and refined by a vendor. Where liquidity/pricing transparency is not available, for example in the area of private loans, assets will typically be manager marked, often with validation provided by an independent valuation firm. There is a range of techniques to value such semi-liquid or illiquid assets, including discounted cash flow analyses or valuation based on pricing information of a set of curated comparable issuers. However, in any instance, the valuer must exercise a degree of judgment in approximating how a hypothetical market participant would contemplate a transaction in the subject

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The SBAI Toolbox is an additional aid to complement the SBAI's standard-setting activities. While alternative investment fund managers sign up to the Alternative Investment Standards on a comply-or-explain basis, the SBAI Toolbox materials serve as a guide only and are not formally part of the Standards or a prescriptive template.

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<sup>1</sup> Although some accounting standards such as International Financial Reporting Standard (IFRS) 9 allow for an 'amortised cost' option, amortised cost (a) is often not appropriate for investment funds because investment funds' business models typically aim to maximise investment returns, and (b) is not compatible with the accounting requirements of institutional investors who must state their investments in fund interests at Fair Value (with a possible exception being a bank or insurance company who consolidates the NAVs of its captive investment arms).

<sup>2</sup> See Appendix A for overview of the corporate lending spectrum

instrument at the measurement date, in order to appropriately implement the IFRS 13 / ASC 820 Fair Value standard.

In the following discussion we examine the spectrum of approaches towards valuation of these instruments.

## 2. What do the Alternative Investment Standards say?

A robust valuation framework plays an important role in addressing conflicts of interest that can arise between managers and their investors as well as between different investors in the same fund and also facilitate timely and robust performance assessment.

Why a robust valuation framework matters to investors (and managers)

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### To address conflicts of interest between different investors:

- For open-end vehicles, achieving correct valuation is important for investors that are subscribing to or redeeming from the fund. A correct valuation is needed to ensure investors are treated fairly, so that neither the subscribers, redeemers or “remainers” are favoured over each other. For example, overvaluing the fund will put remaining and subscribing (incoming) investors at a disadvantage while favouring the redeeming investors.
- The same applies at the level of the investor in the relevant fund. For example, subscriptions and redemptions in a fund-of-fund or the amount of payments in a pension can be affected by the valuation of the fund, which in turn depends on the underlying valuations.
- Where valuations are used for transfers of assets between different funds, neither fund should be favoured over the other.

To **address conflicts of interest between the manager and the investor(s)**: Valuations directly affect the reported performance of a fund and will generally also affect the compensation of the manager.

### To facilitate performance assessment:

- Comparison of performance of different funds based on changes in valuation is likely to influence subsequent fundraising and the allocation of capital between funds. Also, interim NAVs are integral to the investor’s periodic risk monitoring process.
  - Investors often make internal employee performance assessment and incentive compensation decisions based on the interim performance of underlying investment funds – even in closed-ended investment funds.
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The valuation section of the Alternative Investment Standards<sup>3</sup> sets out the key features of a robust valuation framework:

### 1. Putting in place adequate governance arrangements in valuations (including segregation of functions, documentation)

Standard	What the Standard says
5.1	Put in place arrangements aimed at mitigating conflicts of interest
5.2	Where manager has inhouse valuation, separate valuation function <sup>4</sup>
6.1	Valuation policy document to cover all material aspects of the valuation process, controls and monitoring processes
8.4	Escalation of material valuation issues to the fund governing body

### 2. Setting out approaches to value hard-to-value assets to ensure consistency

Standard	What the Standard says
7.1	Where in-house valuation of hard to value assets is performed, valuation procedures to be aimed at ensuring consistent approach (with detailed guidance for use of pricing hierarchies, broker quotes and pricing models)
7.2	Use of side pockets (incl. eligible assets, timing, fees)

### 3. Disclosure to investors and ongoing reporting requirements

Standard	What the Standard says
6.1	Disclosure of valuation policy document to investors
6.2	Disclosure of portfolio manager involvement in valuation process
8.1	% percentage of portfolio in “liquidity” buckets
8.2	Investor notification of material increases in hard-to-value assets
8.3	Periodic reporting of value of side pockets
8.4	Disclosure of other material issues to investors

The *governance* arrangements provide an overarching framework to establish and manage the valuation process with a view to ensuring fair treatment of investors. Most valuation challenges arise in the context of hard to value assets, and the Alternative Investment Standards seek to establish a *reliable approach* for dealing with hard to value assets. The *investor disclosure* requirements ensure that investors can make well informed judgements about the valuation process as well as the ongoing valuation of assets.

### The Valuation Policy Document

An important disclosure is the manager’s Valuation Policy Document to investors<sup>5</sup>, which should be the starting point of an investor’s due diligence of the valuation framework (see section 5: Questions for Investors to ask).

<sup>3</sup> See Appendix B for overview, the Standards are available at <https://www.sbai.org/standards/>

<sup>5</sup> Disclosure upon request on a confidential basis (since Valuation Policy Documents can contain sensitive intellectual capital about the manager’s procedures, models, etc. and can be seen a competitive differentiator)

## Standard 6.1 Valuation Policy Document

A document (a “Valuation Policy Document”) covering all material aspects of the valuation process and valuation procedures and controls in respect of the fund should be prepared. The Valuation Policy Document (which it is acknowledged will contain information which is proprietary to the fund manager) should be reviewed regularly by the fund manager, in consultation with the fund governing body, and be made available to investors upon request on a confidential basis.

### **The SBAI envisages that in most circumstances the Valuation Policy Document will describe:**

- the responsibilities of each of the parties involved in the valuation process;
- the processes and procedures in place that are designed to ensure that conflicts of interest are managed effectively;
- the relevant material provisions of any service level agreements (SLAs) entered into with third parties responsible for or involved in the valuation process (excluding details of commercial aspects of any such SLAs); and
- the controls and monitoring processes in place that are designed to ensure that the performance of any third party to whom the valuation function is outsourced is satisfactory.
- (...)

Source: *Alternative Investment Standards, Valuations* (<https://www.sbai.org/standards/>)

## 3. What do Accounting Standards say?

The two principle accounting standards, International Financial Reporting Standards (IFRS) and US General Accepted Accounting Principles (US GAAP) cover the valuation of financial instruments.

- IFRS 9 contains guidance on the recognition, derecognition, classification and measurement of financial instruments, including impairment and hedge accounting. However, it does not provide specific guidance for investment companies or private funds. Basically, investment companies follow the generic IFRS.<sup>6</sup>
- Under US GAAP, specific guidance is available for investment companies through the Financial Accounting Standards Board’s (FASB’s) Accounting Standards Codification (ASC) 946 Financial Services-Investments Companies. It covers a variety of special rules for both recognition and measurement of typical transactions entered into by investment companies, as well as financial reporting requirements

The following sections set out the specific requirements under IFRS and US GAAP.

### 3.1 IFRS 9

International Financial Reporting Standards (IFRS) 9 (Financial Instruments) became effective for years beginning on or after 1 January 2018.<sup>7</sup> IFRS 9 provides a framework for the classification of financial instruments into one of three categories:

- Fair Value through Profit & Loss (“FVPL”)
- Fair Value through Other Comprehensive Income (“FVOCI”)
- Amortised Cost (“Amortised Cost”)

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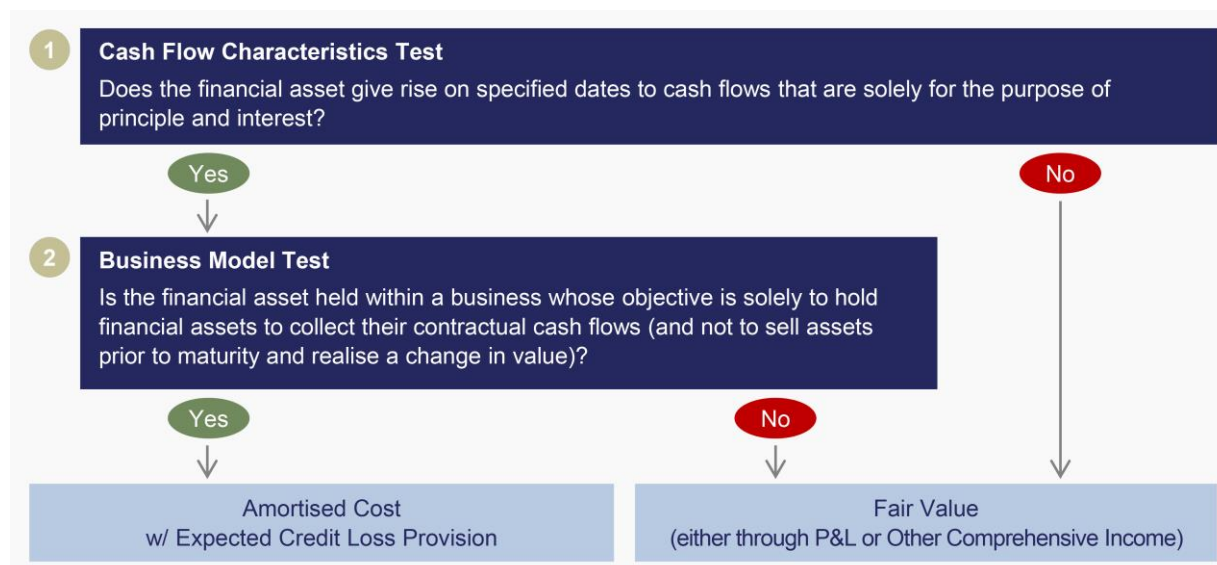
<sup>6</sup> The International Accounting Standards Board (IASB) recognises the concept of an investment entity in IFRS 10 and exempts them from the requirement to consolidate subsidiaries for eligible investment entities

<sup>7</sup> IFRS 9 replaces IAS 39, which had more exceptions and was considered too complex.

With respect to the two Fair Value options (through P&L or OCI)<sup>8</sup>, the relevant accounting definition of Fair Value is contained in IFRS 13<sup>9</sup>.

Equity and equity-like financial instruments are automatically classified for Fair Value treatment (“FVPL” or “FVOCI”) under IFRS 9. For debt and other fixed income instruments, IFRS 9 defines a two-step test which helps the financial instrument preparer determine whether the instrument should be classified for Fair Value or Amortised Cost: (i) the “Cash Flow Characteristics Test” and (ii) the “Business Model Test”. The two-step test is illustrated in the simplified decision tree below.

## IFRS Decision Tree: Cash Flow Characteristics and Business Model Test<sup>10</sup>



The two tests above are fairly straightforward but allow for a degree of interpretation. For example, the IASB provides no guidance with respect to what is meant by “solely for the purposes of principle and interest”. Arguably, any feature other than contractual periodic coupons and bullet payment at maturity (such as original issuer discounts, exit fees, margin ratchets, fees on undrawn amounts, etc.) could be construed as ‘other than’ for the purposes of paying principal and interest.

Despite this ambiguity in the Fair Value classification under IFRS 9, alternative investment fund managers might find the Fair Value option appropriate because:

- Fair Value is required by investors for their own Fair Value accounting purposes (and for them to make capital allocation decisions, risk monitoring assessment, incentive compensation decisions, etc.)
- Fair Value does not require a complex Expected Credit Loss (ECL) provisioning exercise (required under the Amortised Cost approach)<sup>11</sup>, and
- Fair Value provides both the investor and the investment manager useful information on interim fund performance, while Amortised Cost does not

<sup>8</sup> This document does not intend to provide guidance on the merits of either treatment, and will refer to both collectively as Fair Value

<sup>9</sup> Fair Value: “the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date (an exit price)”

<sup>10</sup> Source: SBAI research

<sup>11</sup> See Appendix B for a description of the Expected Credit Loss (ECL) Provision under the Amortised Cost Approach

### 3.2 US GAAP

Investment companies in the US must follow ASC 946. ASC 946 states that investment companies must use Fair Value, in accordance with ASC 820<sup>12</sup>, but there is “no classification” framework “decision tree” to further distinguish the treatment of fixed income instruments like there is under IFRS 9. Also, because there is no amortised cost option under ASC 946, there is no ‘expected credit loss’ model equivalent to the ECL model under IFRS 9.<sup>13</sup>

## 4. Fair Value Process for Direct Loans

This section sets out one (illustrative) approach for a “Fair Value Process for Direct Loans”.

The Alternative Investment Standards set out a range of measures aimed at ensuring a consistent approach to determining Fair Value, including governance arrangements of the valuation process as well as procedures managers can put in place in situations where valuations of hard-to-value assets are undertaken inhouse or where the manager is otherwise involved in providing final prices to valuation service providers.<sup>14</sup>

The more specific measures and processes for the valuation of hard-to-value assets (including loans) set out in the Standards include:

- Details of a hierarchy of pricing sources and models used
- Frameworks to using broker quotes
- Governance of pricing models (documentation, approval, monitoring and verification against observed market prices, handling of overrides, ...) <sup>15</sup>

The following sections provides an overview of how the process for establishing Fair Value for direct loans can look like.

### Illustration: 3-step process to establish Fair Value<sup>16</sup>



#### 4.1 Enterprise Value Estimation

To determine the appropriate approach for estimating the Fair Value of a specific financial instrument, one will typically first estimate the subject company’s enterprise value (the “Enterprise Value”) to develop an understanding of the overall financial condition of the issuer and the subject instrument’s relative positioning within the capital structure. This analysis aids in the selection of a valuation approach or approaches that best reflect the situation of the issuer and the characteristics of the instrument being valued. As set forth in the IPEV Guidelines<sup>17</sup> and the AICPA<sup>18</sup> Valuation Practice Guide, the two primary methodologies for enterprise value estimation are as follows:

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<sup>12</sup> Fair Value: “the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.”

<sup>13</sup> Note: there is an equivalent for banks and insurance companies, which is called ‘Current Expected Credit Loss’ or ‘CECL’, however, that is not relevant for investment funds.

<sup>14</sup> See Standards 5.1, 5.2 (Segregation of functions in valuation) and 7.1 (Hard-to-value assets)

<sup>15</sup> Standard 7.1

<sup>16</sup> Source: SBAI research

<sup>17</sup> International Private Equity and Venture Capital Valuation Guidelines:

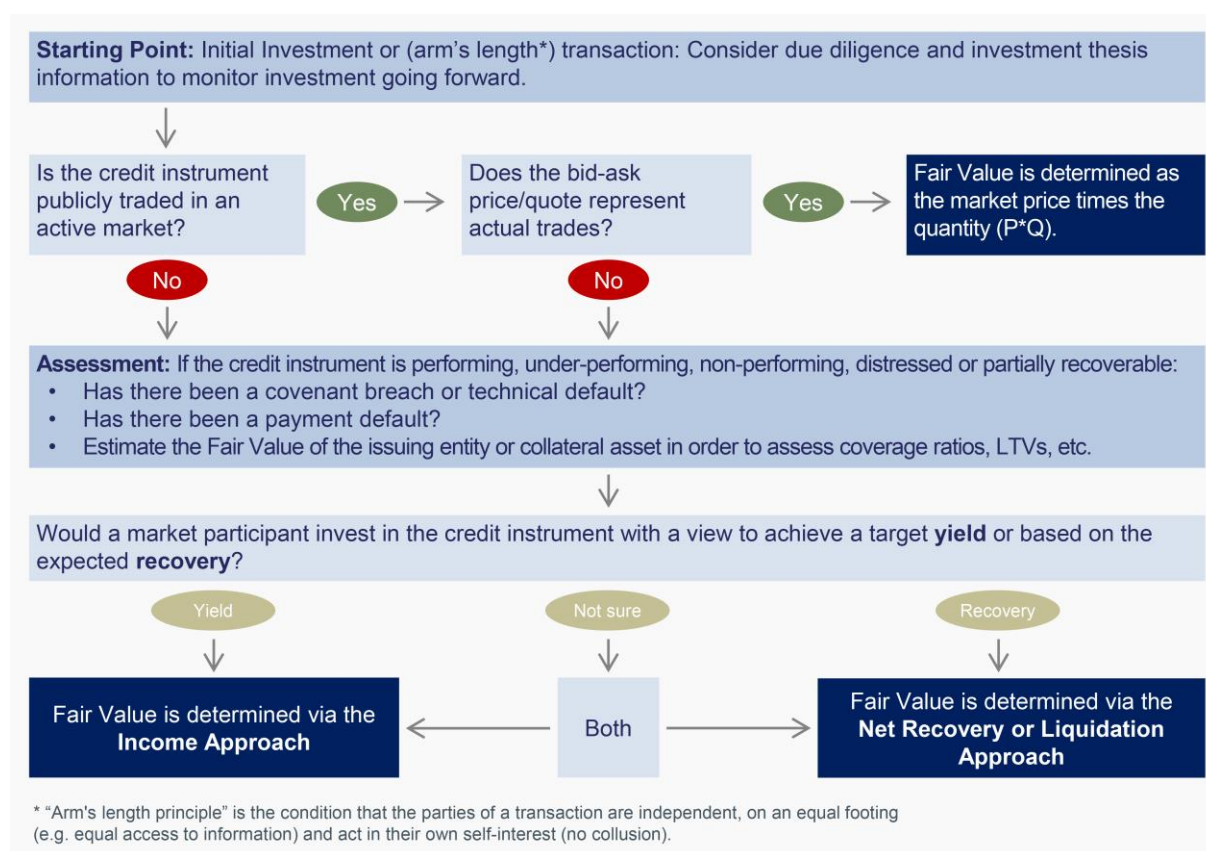
<sup>18</sup> American Institute of CPAs (Certified Professional Accountants)

- The income approach (“Income Approach”) is a valuation technique that provides an estimation of the Fair Value of an Investment based on expectations about the cash flows that an Investment would generate over time
- The market approach (“Market Approach”) is a valuation technique that provides an estimation of Fair Value based on market prices in actual transactions and on asking prices for comparable businesses

#### 4.2. Financial Instrument Specific Valuation Approaches

Having estimated the Enterprise Value for the subject issuer, the appropriate approach needs to be determined to value the financial instrument.

#### Illustration: Assessment to determine valuation approach for financial instruments<sup>19</sup>



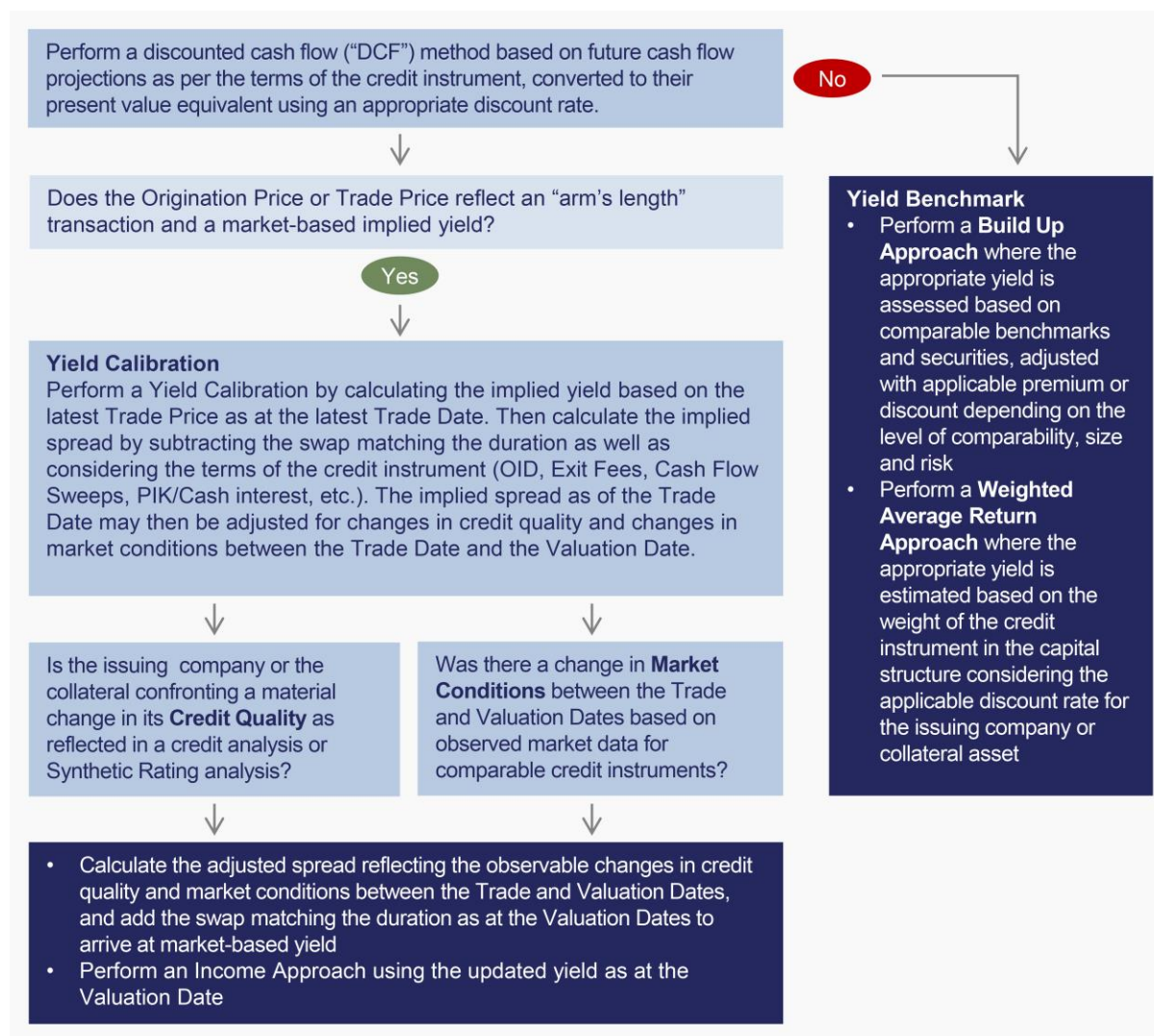
In situations where market prices are not available, this assessment points at the Income Approach and the Net Recovery Approach to value the financial instruments.

<sup>19</sup> Source: SBAI research

#### 4.2.1 Income Approach

When an Enterprise Value Estimation (and/or an asset collateral analysis) indicates there is adequate coverage of a debt instrument (i.e. the issuer is expected to pay according to their contractual interest and principle repayment schedule), the Income Approach is typically considered to estimate a range of Fair Values. In performing the Income Approach, the contractual cashflows of the debt instrument are discounted to present value using a discount rate that captures the credit quality of the subject instrument, and market conditions for similar instruments.

#### Illustration: “Income Approach” process<sup>20</sup>



When applying the Income Approach, one of the following approaches to estimate a discount rate is typically considered.

#### Fixed Income Yield Determination – Calibration Approach

In applying the Yield Calibration Approach, the discount rate is determined by first estimating the implied yield as of the latest date where the instrument was involved in an arm’s-length transaction (the “Transaction Date”). The yield as of the Transaction Date provides a useful calibration point for estimating

<sup>20</sup> Source: SBAI research



a market participant yield as of the valuation date (the “Valuation Date”). Appropriate transactions often include: (1) the initial primary market transaction, (2) secondary transactions and (3) amendments where the Investment was re-priced. The implied yield is estimated using the following internal rate of return formula:

$$-P_0 + \sum_{t=0}^n \frac{CF_t}{(1+k)^t} \dots + \frac{P_m + CF_m}{(1+k)^t} = 0$$

Where:

- P<sub>0</sub>: Proceeds received at the Transaction Date (net of transaction costs);
- P<sub>m</sub>: Principal due at maturity;
- CF<sub>t</sub>: Interest payments; and
- k: Implied yield (discount rate such that the sum of the present-valued cash flows equals P<sub>0</sub>.)

For variable-rate securities, a swap rate corresponding to the time to expected maturity is then subtracted from the implied yield to derive an implied credit spread as of the Transaction Date. The credit spread as of the Transaction Date is used as a calibration point to derive an implied credit spread as of the Valuation Date, based on (a) changes in credit quality, and (b) changes in market conditions, between the two dates. Adding back a swap rate corresponding to the time to expected maturity, to the concluded range of credit spreads yields an estimated range of discount rates.

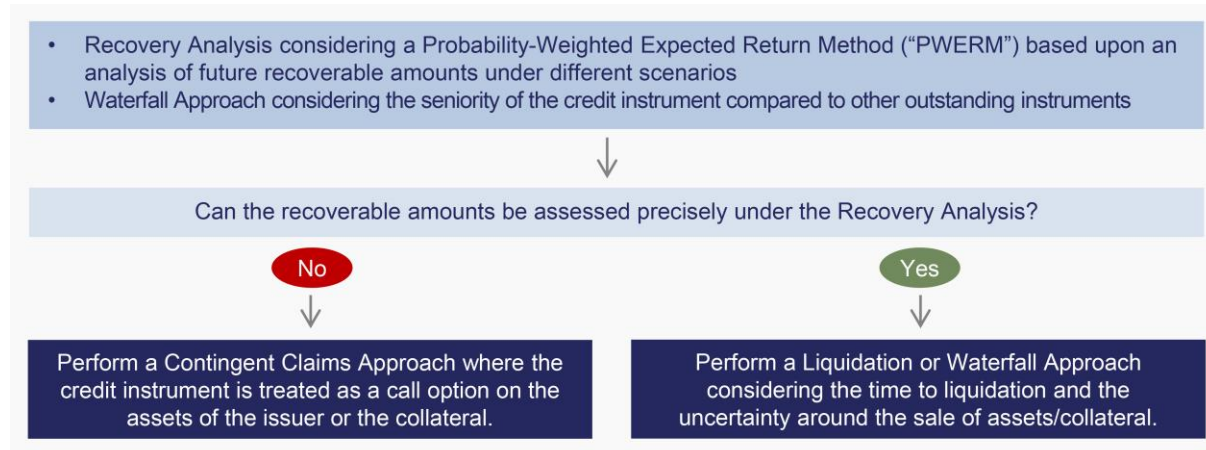
#### **Fixed Income Yield Determination – Build Up Approach**

In applying the Build Up Approach, a discount rate is determined by first assessing credit spreads and yields from comparable benchmarks and comparable securities as of the Valuation Date. Based on the level of comparability, size and risk of the subject security relative to the comparable benchmarks, a premium or discount may be applied. For variable rate securities, adding back a LIBOR or EURIBOR-based swap rate, corresponding to the time to expected maturity, to the concluded range of credit spreads yields an estimated range of discount rates.

#### **4.2.2 Net Recovery Approach**

When an Enterprise Value Estimation (and/or an asset collateral analysis) indicates that a subject security is no longer performing or otherwise not fully recoverable under its legal terms of payment, the Net Recovery Approach is typically considered. The Net Recovery Approach begins with estimating the expected cash flows to be realised under the payment terms of the subject security, as well as the timing and amount of the recovery value (based on an estimated future Enterprise Value). The projected cash flows are then discounted to present value at a rate commensurate with the risks associated with the security to arrive at an estimate of Fair Value.

## Illustration: Net recovery or liquidation approach<sup>21</sup>



## 5. Key questions for investors to ask

This section focusses on the key questions investors need to ask when assessing an alternative credit manager’s Valuation Policy Document and overall approach to valuation:

### Governance

- Is the manager a signatory to the SBAI’s Alternative investment Standards?
- *If yes, investors should request the manager’s Disclosure Statement in relation to the Standards. Investors can then review any “explanations” the manager might have in relation to the Standards.*
- Are valuations conducted inhouse or by a third-party valuation service provider?

### Where valuations are conducted by a third-party valuation service provider:

- Does the provider provide an “opinion on the manager’s valuation” or conduct independent valuations?

### In situations where the manager is involved in the valuation process:

- Who reviews and approves valuations?
- If there is a Valuation Committee:
  - Who participates in the Valuation Committee?
  - How frequently does it meet?
  - Are Valuation Committee Meeting Minutes provided to the Board of Directors for review? If not, what role does the Board of the Fund play? What information is provided to it?
- What level of independence is there in oversight of the valuation process? (i.e. external independent participation in the Valuation Committee, independent valuation reviews at critical dates (e.g. bi-annual review by actuarial firm), majority independent non-executive directors on the Board of the Fund?)
- Is there an auditable trail in the valuation process?

### Process for valuing alternative credit instruments

- Is there a Valuation Policy document that specifically discusses the valuation methodologies and /or process for alternative credit instruments?
- *SBAI Signatories who comply with Standard 6.1 will make the Valuation Policy Document available to investors upon request on a confidential basis*

<sup>21</sup> Source: SBAI research

- How are valuation methodologies implemented and the outcomes approved?
- How does the manager ensure consistency of valuation over different periods and assess the quality and availability of external marks (valuations) used in the valuation process?

#### Investor disclosure

- Does the Administrator produce Administrator Transparency Reports (ATRs) that include verification of existence of assets and contracts, percentage of assets independently valued by the administrator or other third parties, and classification of assets and/or liabilities by Level?
- How are assets in trusts classified?

## Appendix A: Overview Corporate Lending Spectrum

	Corporate Bond Market	Medium – Large Syndicate & Private Loan Market	Small Private Loan Market
Typical Issuer	<ul style="list-style-type: none"> <li>• Large stable corporation</li> <li>• High credit quality (at or near investment grade)</li> <li>• Transparent financial reporting</li> </ul>	<ul style="list-style-type: none"> <li>• Small-large corporations</li> <li>• Varying risk profile (low risk - speculative grade)</li> <li>• Varying degrees of transparency</li> </ul>	<ul style="list-style-type: none"> <li>• Small or medium size company</li> <li>• Higher leverage</li> <li>• Can be speculative grade</li> <li>• Financial reporting less widely available</li> </ul>
Instrument Characteristics	<ul style="list-style-type: none"> <li>• Large facility size</li> <li>• Usually liquid/publicly traded</li> <li>• Less active covenants</li> <li>• Bond allows for many investors in single bond issuance</li> </ul>	<ul style="list-style-type: none"> <li>• Varying facility sizes</li> <li>• Illiquid or thinly liquid (limited secondary market for syndicate)</li> <li>• Can have active covenants</li> <li>• Usually multiple investors</li> </ul>	<ul style="list-style-type: none"> <li>• Typically \$25m to \$200m facility size</li> <li>• Not traded/liquid</li> <li>• Active covenants</li> <li>• Single investor or small number of investors</li> </ul>
Typical Investor	<ul style="list-style-type: none"> <li>• Institutional investors (e.g. pension funds, sovereign wealth funds, endowments)</li> <li>• Mutual funds</li> <li>• Hedge/credit funds</li> </ul>	<ul style="list-style-type: none"> <li>• Banks/bank syndicates</li> <li>• Hedge/credit funds</li> <li>• Other institutional investors</li> <li>• Collateralised Loan Obligations (CLOs)</li> </ul>	<ul style="list-style-type: none"> <li>• Banks</li> <li>• Hedge/credit funds</li> <li>• Other institutional investors</li> <li>• Collateralised Loan Obligations (CLOs)</li> </ul>

## Appendix B: IFRS 9 - Amortised Cost Valuation – Expected Credit Loss Provisions

Amortised cost is an accounting classification for financial assets under the International Financial Reporting Standards (IFRS). The value of financial assets classified under this method are reported on a company's balance sheet by using the *amortised cost method*:

$$\begin{aligned} \text{Value} &= \text{Initial acquisition amount} \\ &\quad - \text{principal repayment} \\ &\quad +/\text{- amortisation of discount/premium (if any)} \\ &\quad +/\text{- foreign exchange differences (if any)} \\ &\quad - \text{provision for Expected Credit Loss (ECL)} \end{aligned}$$

Only debt instruments are eligible for using the amortised cost method, which assumes that the business model for the asset is “collecting contractual cash flows” with no intent to sell the asset prior to maturity.<sup>22</sup>

### Provision for Expected Credit Losses

A requirement under the amortised cost option of IFRS 9 is the requirement to estimate a provision for Expected Credit Loss (“ECL”). The rationale behind the ECL framework is to recognise the potential credit loss that exists for every credit instrument on a prospective probability-weighted present value basis. The ECL framework replaced the IAS 39 impairment framework, which recognised impairment only once evidence of impairment was observed, rather than on a prospective basis.

IFRS 9 requires that at each assessment date, an entity shall measure the loss allowance for a financial instrument at an amount equal to 12-month expected credit losses (the “12-month ECL”). If, however, at the assessment date, the credit risk on that financial instrument has increased significantly since initial recognition, the entity shall measure the loss allowance for the financial instrument at an amount equal to the *lifetime* expected credit losses (the “Lifetime ECL”).

IFRS 9 does not stipulate how expected credit losses should be calculated, but it requires that the measurement should reflect (a) an unbiased and probability-weighted amount, (b) the time value of money, and (c) reasonable and supportable information at the assessment date about past events, current conditions and forecasts of future economic conditions.

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<sup>22</sup> The other accounting classification applicable to debt instruments is “fair value through profit or loss” (FVPL), which assumes that assets are intended to be held for a certain period and then sold (with a profit/loss).

## Illustrative Framework to Determine Expected Credit Loss (ECL)

### Step 1: Assessment of Credit Risk

The first step in assessing the provision for ECL as of the initial reporting date, a credit analysis of the issuer is performed based on the ratings methodology for similar issuers. One way to accomplish this is to use credit ratings methodologies published by Moody's Investors Service, Standard & Poor's, or Fitch. The resulting credit rating allows one to estimate the ECL based on the probability of default ("PD") and the Loss Given Default ("LGD") associated with that particular credit rating by discounting the exposure at default ("EAD") by the effective interest rate ("EIR")<sup>23</sup>, which is the implied yield of the instrument based on the issue price and expected duration. To do so, we measure the 12-month ECL based on the following formula:

$$(EAD * PD_{12\text{-month}} * LGD_{12\text{-month}}) / (1+EIR) = ECL_{12\text{-month}}$$

Subsequent to the initial recognition, to capture the evolution of the Company's credit risk, one must assess the issuer's change in credit quality between the date of the initial investment and the assessment date by performing a re-assessment of the credit rating as of the assessment date. If a decline in Credit Quality is measured, the ECL estimation is repeated, but with a lifetime horizon rather than with a 12-Month horizon:

$$(EAD * PD_{\text{Lifetime}} * LGD_{\text{Lifetime}}) / (1+EIR) = ECL_{\text{Lifetime}}$$

### Step 2: Estimating PD and LGD

In applying the above formulae (whether on a prospective 12 months basis or on a lifetime basis), the next step is to develop PD and LGD estimates on a forward-looking basis matching the appropriate time horizon (either 12 month or lifetime). While credit rating agencies such as Moody's, S&P, and Fitch often publish historical PD and LGD statistics for the full spectrum of credit ratings, they do not publish prospective credit ratings.

Therefore, the historical PD and LGD need to be converted into prospective PD and LGD. If, for example, an analysis indicates that historical PD and LGD data is correlated with macroeconomic indicators, such as GDP estimates, methods exist to convert historical PD and LGD into adjusted prospective PD and LGD based on forward looking macroeconomic indicators.

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<sup>23</sup> The EIR is defined as the internal rate of return ("IRR") that "[E]xactly discounts estimated future cash payments ("CF") or receipts through the expected life of the financial asset or financial liability to the gross carrying amount of a financial asset or to the amortised cost of a financial liability":

$$\text{Carrying Amount} = \sum_{t=1}^T \frac{CF_t}{(1 + IRR)^t}$$